Progress of the 325 MHz sc CH Cavity *

M. Busch†[1], *H. Podlech*[1], *U. Ratzinger*[1], *W. Barth*[2,3], *S. Mickat*[2,3], *and M. Amberg*[1,3]
[1]Institut für Angewandte Physik, Goethe Universität, Frankfurt; [2]GSI, Darmstadt; [3]HIM, Mainz

Abstract

At the Institute for Applied Physics (IAP), Frankfurt University, a superconducting 325 MHz CH-Cavity has been designed and built. The 7-cell cavity features a geometrical β of 0.16, corresponding to a beam energy of 11.4 AMeV. The design gradient is 5 MV/m. Main novel features of this resonator are a compact design, low peak fields, easy surface processing and power coupling. Furthermore a new tuning system based on bellow tuners inside the resonator will control the frequency during operation. The progress in processing the cavity as well as tuner drive measurements are presented.

Progess and Setbacks

After successful measurements [1] at Frankfurt the cavity was sent back to Research Instruments for final processing steps. Buffered Chemical Polishing and High Pressure Rinsing (s. fig. 1) have been performed.

Figure 1: Set-up for BCP (left), Mounting for HPR (right).

Afterwards a helium leak was found in the area of the pick-up pipe socket which led to a reaming of the pick-up pipe (s. fig.2). The subsequent reparation steps have been performed and the processing steps can be repeated.

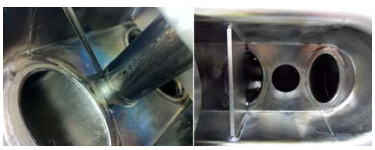

Figure 2: Helium leak at the pick-up pipe (left), Reamed pick-up pipe (right).

* Work supported by GSI, BMBF Contr. No. 06FY7102, FAIR@GSI PSP code:6-6-7-05
† busch@iap.uni-frankfurt.de

Tuner Measurements

The new dynamic frequency tuner for sc CH-Cavities consisting of a stepper motor and a fast piezo actuator provides slow and fast tuning by pushing/ pulling capacitive acting dynamic bellow tuners, which are welded on the girders inside the cavity. The slow tuner must be able to deflect the bellow tuner around +/- 1 mm, which corresponds to a tuning range of several hundred kHz to compensate frequency changes due to evacuation and cavity cool down. Additionaly, fast piezo actuators react on frequency variations in the range of several hundred Hz caused by dynamic effects like Lorentz-Force detuning or microphonics. A prototype of this frequency tuning system was built at the workshop of the IAP. First measurements at room-temperature have been performed.

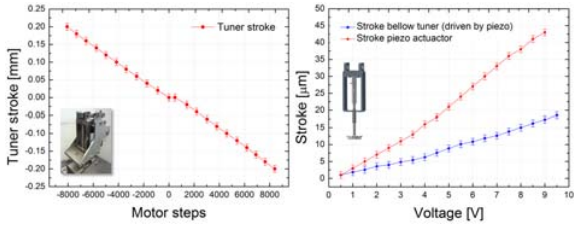

Figure 3: First tuner measurement results at room temperature.

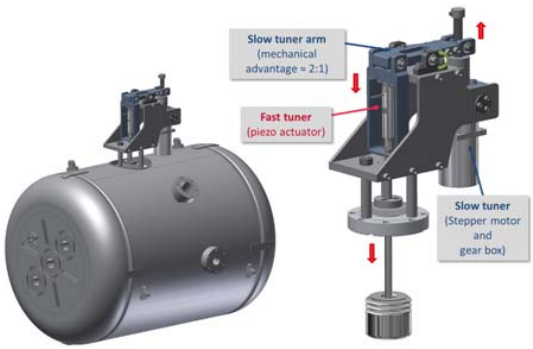

Figure 4: Mounting of the fast tuner system on the helium vessel (left). Main components of the tuner system (right).

References

[1] M. Busch, F. Dziuba, H. Podlech, U. Ratzinger, M.Amberg, "Cold Measurements on the 325 MHz CH Cavity", SRF 2013, Paris, France.

 doi:10.15120/GR-2014-1-FG-UNILAC-16